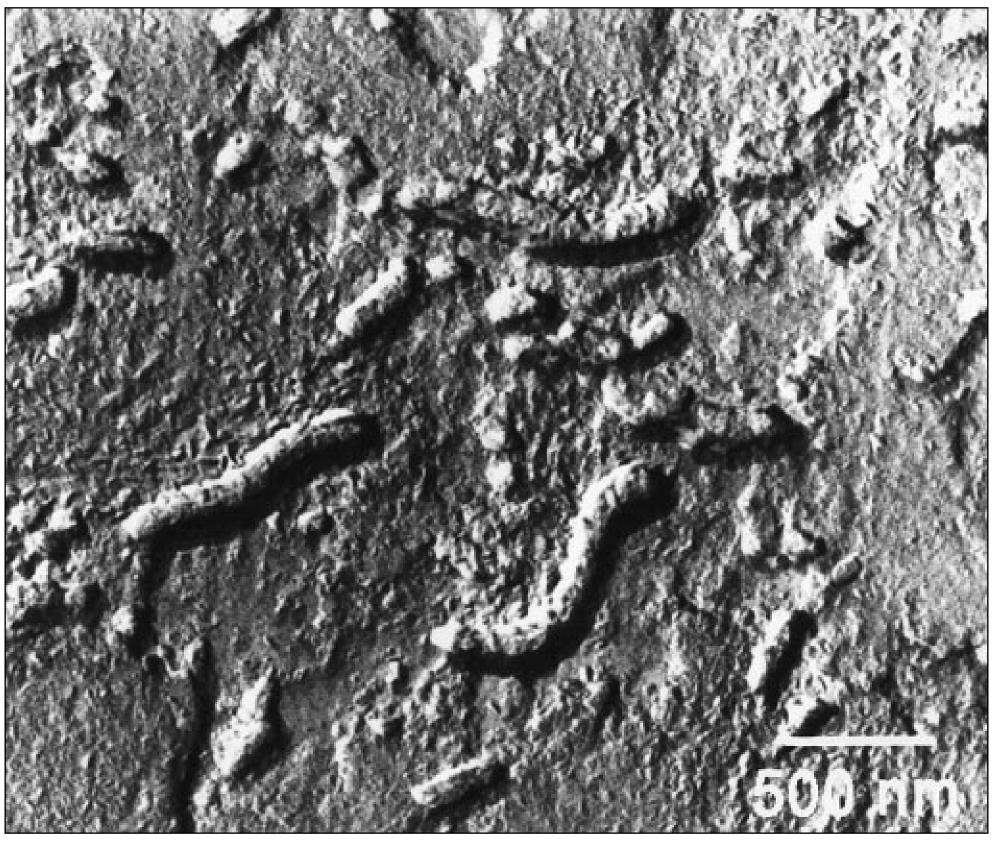
JSC scientists' lives evolved dramatically after their discovery of ancient life on Mars shook the Earth one year ago



Right: This high-resolution electron microscope image of a cast, or replica, from a chip of the Martian meteorite shows the outline of what are believed to be microscopic fossils of bacteria-like organisms that may have lived on Mars more than 3.6 billion years ago. Scientists made a cast of the original, then removed and imaged the cast to avoid harming the original with the electron beam. The tubular features are less that a micrometer in size, or about 1/500th the diameter of a human hair. JSC Photo S96-12299

as the best of what's new in 1996 by presenting a Laurel Award.

The late Carl Sagan wrote in a letter to Planetary Society members that "the recent discovery of possible life on ancient Mars is the most provocative and evocative piece of evidence for life beyond Earth. If the results are verified, it is a turning point in human history suggesting that life exists not on just two planets in one paltry solar system, but throughout this magnificent universe."

As the team began switching its focus from announcing the discovery to working with other scientists trying to verify its work, Thomas-Keprta discovered she had additional demands on her time of a personal nature. During the August press conference, Thomas-Keprta did not feel well and could not understand what was wrong. Three weeks later she found out she and husband, Sean, were expecting their first child.

"As of January, I was unable to travel so I was able to continue my research until Nathaniel's birth in April," she said.

As the team works with other scientists on verification, it also is beginning to explore other areas of the meteorite and other mineral formations on its surface. Other scientists contend that the carbonates may have been formed at high temperatures and therefore could not have supported biological activity. Thomas-Keprta is studying the other types of carbonates to confirm that the rock can have both inorganic and biological formations.

"It's sort of like having a penny in the rock and a quarter in the rock. They are both money but they are different," she explained. "The penny formed at low temperature and has evidence of biogenetic activity. I can say that but I haven't looked at the quarter yet. They have looked at the quarter, but not the penny. So the interesting thing is that different labs can be looking at the same rock but there are lots of different things in that rock. We have to make sure we are looking at the same thing."

The team also is focusing its attention on Earth rocks to verify the Mars discovery. Ongoing studies include volcanic rock flow from the Columbia River in Washington that houses a zoo of organisms, and rocks from Yellowstone that will help the team understand the composition of samples found in hot hydro-thermal areas.

"We recently discovered really tiny bacteria, much smaller than previously reported," McKay said. "We hope to be able to show that there are bacteria today that are living in one- or two-kilometer depths that are very tiny and are in the size range of the Mars bacteria. "We think the Columbia River and Yellowstone rocks are the best examples of what it might have been like on Mars."

'We ourselves want to make sure that we have come up with the right answer. If you do good science you will produce more questions than answers and that's what we have done. Any day that I come in and have more questions than answers is a good day.'

—Kathie Thomas-Keprta

The team also has discovered that bacteria can develop other forms. One of these is very long skinny filaments that produce biofilms. These biofilms are a kind of membrane that provide a gathering place for food and hold bacteria together in a clump so they don't wash away.

"Biofilms are very common in terrestrial bacteria colonies and we think we now see remains of biofilms in the Mars rock," McKay said.

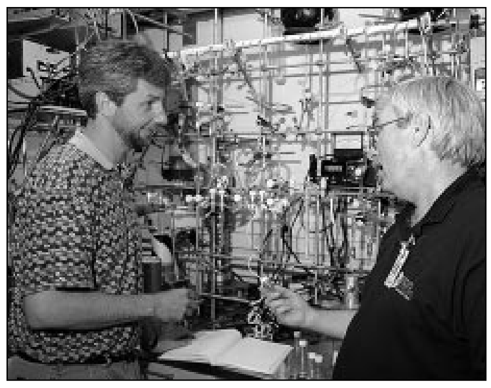
The studies of Mars meteorites have expanded recently with the announcement by NASA and the National Science Foundation of the selection of 16 proposals that will further study ALH84001—the same meteorite that the JSC team used in its research. The NASA grants were awarded under the Ancient Martian Meteorite Research Program, a coordinated project to investigate this and related meteorites in greater depth. The awards total about $1 million for the first year and about $500,000 for the second year. The new studies will focus on repeating and expanding the original findings and further investigation of carbon genesis and mineralogy; microbiology studies; organic chemistry; and age dating.

"It's amazing that a scientific project, published in a peer-reviewed journal, has affected the thoughts of everybody—from the most respected scientists to the man on the street," Gibson said. "It's very unusual for a group of scientists to publish a paper that results in a million and a half dollars dedicated to further study their results."

The future also holds many promises for the trio of planetary scientists. McKay would like to work on ways to use microbes to help support a human base both on the Moon and Mars.

"Astronauts would harvest the microbes like you harvest vegetables on a farm and cook them and extract the useful things like hydrogen and oxygen to help support the space outpost," McKay said. "We are concentrating on the Moon because we have lunar samples. Lunar soil has collected solar wind elements in the outermost layer of each grain and this outer layer is a perfect place for microbes to live and grow. I have learned so much about microbes from studying the Mars rock, and it gave me more confidence to pursue the idea of a microbe farm." ❑

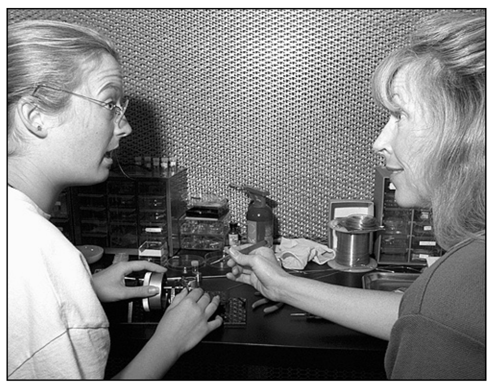
From left, McKay checks on the progress of an electron scan being analyzed by Penny Morris-Smith, a member of the Summer Faculty Program from the University of Houston-Downtown. Morris-Smith is studying volcanic rock flow from the Columbia River in Washington that houses a zoo of organisms.



From left, Chris Romanek of the University of Georgia talks with Everett Gibson on the separation of gases in the vacuum extraction line. Romanek is one of the original eight scientists to discover the fossils in the Mars rock. Romanek spent time in Sweden this past year briefing the Swedish National Research Council which awards Nobel Prizes.

The Mars Meteorite team includes, back row from left, Penny Morris-Smith, Anne Taunton, Everett Gibson, David McKay, Kathie Thomas-Keprta, Sue Wentworth, Carl Allen and Mary Sue Bell. Summer interns, seated from left, are Kate Graham, Susy McKay and Karen Tager.

The newest addition to the Mars Meteorite Team, Nathaniel Thomas Keprta, sports his new outfit.



From left, summer intern Anne Taunton learns how to prepare a sample for the electron microscope from Kathie Thomas-Keprta. Taunton also will spend her summer studying the hot rocks from Yellowstone.

JSC Photos by Steve Candler